

Evolutionary Methods for Design of Dynamic Global World-Class Business for the World Market Society

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"If you are thoroughly conversant with the enemy's strategy, you will recognize the enemy's intentions and thus have many opportunities to win. The principal of strategy is having one thing, to know ten thousand things. There is timing in everything, timing in strategy cannot be mastered without a great deal of practice."

Miyamoto Musashi

Key words: World-Class Manufacturing, Reliability, Global Market, Gap Analysis, Manufacturing Strategy.

Abstract

The new concept of designing global manufacturing for world markets has emerged in the 21 century. Global manufacturing refers to technologies and systems that represent the best modern manufacturing practices successfully implemented in the industries. The concept of dynamic global world-class manufacturing (WCM) has become the single most motivating theory in many major industries and reliability management is one of the basic dynamic WCM strategies for world market. Not only must a company predict the future, it has to do it in a turbulent and dynamic world with the quick information and competence transfer over the world market. WCM techniques are a competitive strategy involving continuous improvement of products, processes and services to improve quality, reduce costs, increase productivity and increase total customer satisfaction. Competitive manufacturing techniques is one of the most talked about manufacturing management approaches of the 1987 and will be a major management focus and trend in the 21st century. Global WCM techniques within the framework of all activities concerned with manufacturing and does therefore place emphasis of the dynamic nature of this system which concerns itself with immediate goals and long term objectives of global market. Main objectives of the paper is to propose a conceptual framework for dynamic global WCM and presents tools which are used. The paper uses a case study to illustrate its findings based on company experiencing both rapid growth and increasing international competition for achieving world-market.

Introduction

New manufacturing technologies can constitute an effective mean of preventing industrial waste if these equipments are adopted and implemented in a context of WCM strategic. The objective of the reliability management is to identify to decide on suitable protective measures. As far as possible protection must be provided by increasing reliability through design methods, thus improving not only safety but also production and working conditions and reliability by dynamic WCM. This also results in the best integration of production performance as well as minimum cost. However, the range and sophistication of these techniques places dynamic global WCM status beyond the aspirations and competence of many industries. During recent decades, there has been a considerable increase in the application of WCM in the industries.

What is striking is that the dynamic WCM management is to a great extent individual oriented, aimed mainly at the knowledge of the professional himself (1). It is believed that all requires a changing within reliability management specialist knowledge is not the only factor involved, but also the co-ordination of activities, the transfer of information, the mode of communication and the deviation of authority. Main objectives of the paper is to propose a conceptual framework for global WCM and presents tools which are used. The paper is based on an ongoing research programme designed to identify how the concept of global WCM can be made more relevant to achieve successful world market. The question in this paper is which problems the management of manufacturing may encounter when it wants to organise the successful manufacturing of the professional manufacturing more systematically. These problems such as, determining WCM reliability norms, developing a global management methodology, the demonstrability of dynamic global WCM in the professional manufacturing. Dynamic global WCM management needs to be performed in order to provide an answer to this question.

(1) Farsijani, H., 1996, "World-Class Manufacturing: Techniques for Implementation for SMEs", Proceedings of the International Engineering Management Conference, IEEE Engineering Management, Vancouver B.C; Canada.

1. The State of Global World-Class Manufacturing

Global WCM an integrated combination of processes, machine systems, people organizational structures, information flows, control systems and computers whose purpose is to achieve economic product manufacture and internationally competitive performance through reliability management. This term can be used to explain many different philosophies and techniques. The system must have integrated controls which systematically operate it to ensure that the competitiveness objectives are continually met and which adapt to change. A full range of elements of production are affected: management of quality, job classification, labour relations, training, staff support, supplier and customer relations, product design, plant organisation, scheduling, inventory management, transport, handling, equipment selection, equipment maintenance, the product line, the accounting system, the role of the computer, automation and others".

Creating dynamic WCM is a management philosophy that emphasises the need to meet external and internal customers needs and expectations and the importance of doing things right for world market. Successful WCM management is now becoming more an area for explicit attention for all kind of manufacturing. The reliability considers with the specification and achievement of quality. Reliability, safety, quality and cost are linked, higher quality being associated with higher reliability for world market. Dynamic global WCM is now becoming more an area for explicit attention for all kind of manufacturing (1). The new concept of designing global products for global markets has emerged in the 21 century. The design of global products for global markets entails a major shift in both marketing and design philosophies for most manufacturing companies.

2. Knowledge of Applying WCM Strategy for World Market

Development of company strategy theory requires a smaller, less complex set of variables, and recognition of the variables impact on performance. It is proposed framework for manufacturing strategy for achieving world market table (1) indicates in assessing the current contribution manufacturing that is making to the competitive edge of the company. The tools to link these decisions to strategic choices are only being developed. Such a theory will improve productivity in WCM reliability by improving their strategic choices, such as:

- a. Strengths and weaknesses
- b. Industry bases of competition
- c. Global competitive position
- d. Industry structure and dynamic

“ Table (1) Manufacturing Strategy for Global Markets”

| Order-Winning Criteria for Reliability Management | Manufacturing Strategy | Manufacturing Strategy |
|---|------------------------|-------------------------------|
| | Process Choice | Infrastructure |
| Delivery reliability | Process | Organisational structure |
| Eliminate waste | Technology | Work structuring |
| Volume flexibility | Capacity decisions | Quality assurance and control |
| Design flexibility | Inventory | Production planning systems |
| Quality conformance | Control systems | |
| Quality capability | Process | |

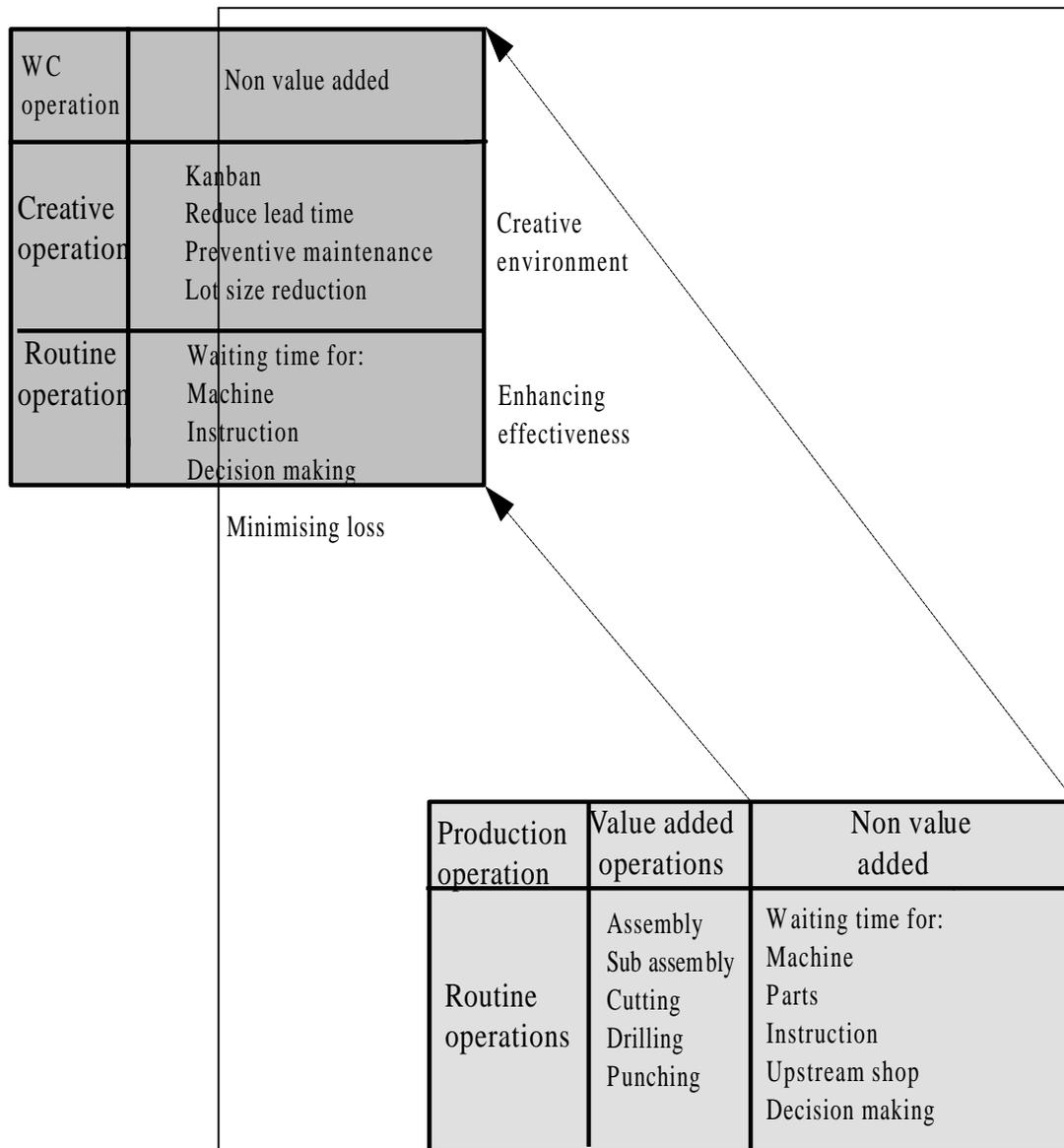
Farsijani(1996) coined the term dynamic global WCM to cover the many techniques and technologies designed to enable a company to match its best competitors. The range and sophistication of advanced techniques places WCM status beyond the aspirations and competence of many companies. Companies progress by stages toward the desired goal of global competitiveness .manufactures will have to achieve dynamic WCM status to compete effectively in global markets. Manufacturers worldwide are having to adapt to new conditions of world market and to new definitions of world-class performance. Theory and practice meet when managers attempt to identify those variables that have the greatest effect on performance for their own company and competitive environment. For global WCM strategy there is two goals: first the distinct unique technology developments in manufacturing processes and operations offer a marketing advantages that competitors are unable to match. Second, manufactures should make process and

(1) Hayes., R.H, 1998, Dynamic manufacturing, New York: The Free Press.

infrastructure design choices that are consistent with the way that products win orders. Dynamic WCM strategy is seen as a competitive weapon with new productivity ingredients for WC performance.

3. The Role of Process Re-engineering Architecture in Global Market

One of the important approaches available to companies is process re-engineering for achieving improvements in critical success factors (CSF) based on performance measurements. Since global WCM techniques is designed to improve effectiveness and efficiency of routine operations, non essential non value added operations should be eliminated, and appropriate global WCM used to make the remaining non value added operations as effective as possible. These companies can use the methods of re-engineering to achieve radical change in processes, to reduce cost, increase quality for world market. Figure (1) shows the main possible dynamic WCM operations appropriate to industries applied to the two areas of value added and non-value added operations. Some non-value added operations are related directly to production, as shown in figure (1).



“Figure (1) Development Operations of Dynamic Global WCM”

To achieve rapid throughput and opportunities for increasing productivity, the company should rethink every activity of every employee from line workers to management, and then cut costs, eliminate waste and rapidly improve efficiency. The focus of the process should be on minimising cost, maximising customer satisfaction/safety and avoiding quality loss. From the points of view of improving effectiveness and efficiency, the needs of the two types of operation are different. To achieve reliability status for world market, it is necessary to build a creative environment in order to increase the flow of new ideas and to encourage employee involvement. The efficiency of value added operations can be enhanced through reduced lead times, reduced WIP, reduced inventory and improve reliability management for world market (1).

4. Creating A Global WCM Model For Competitive Advantage

Dynamic WCM and operating structures employed are one way of identifying the maturity of the companies. The techniques covered by WCM must be made recognisable and relevant to the reliability. Many manufacturing companies searching to becoming more reliability, because of developing faster design and manufacturing cycles has made more serious by stages. Table (2) indicates competitive priorities and measurement criteria. Incorporation of the supplier in the design and development of products is as important. Simultaneous engineering can be defined as the delivery of better, cheaper, faster products into the market by a lean way of working, using multidiscipline teams, right first time method and parallel processing activities to continuously consider all constraints. In a perspective on industrial global WCM management operational objectives are as follows:

1. To identify the various strategic advantages that differentiate companies with average performance.
2. To identify the technological competences and resources that have an effect on performan.
3. To analyse the other companies capacities that can explain performance in industrial reliability.
4. To identify key elements in the decision process that have an impact on performance for world market.

“ Table (2) Competitive Priorities and Measurement Criteria ”

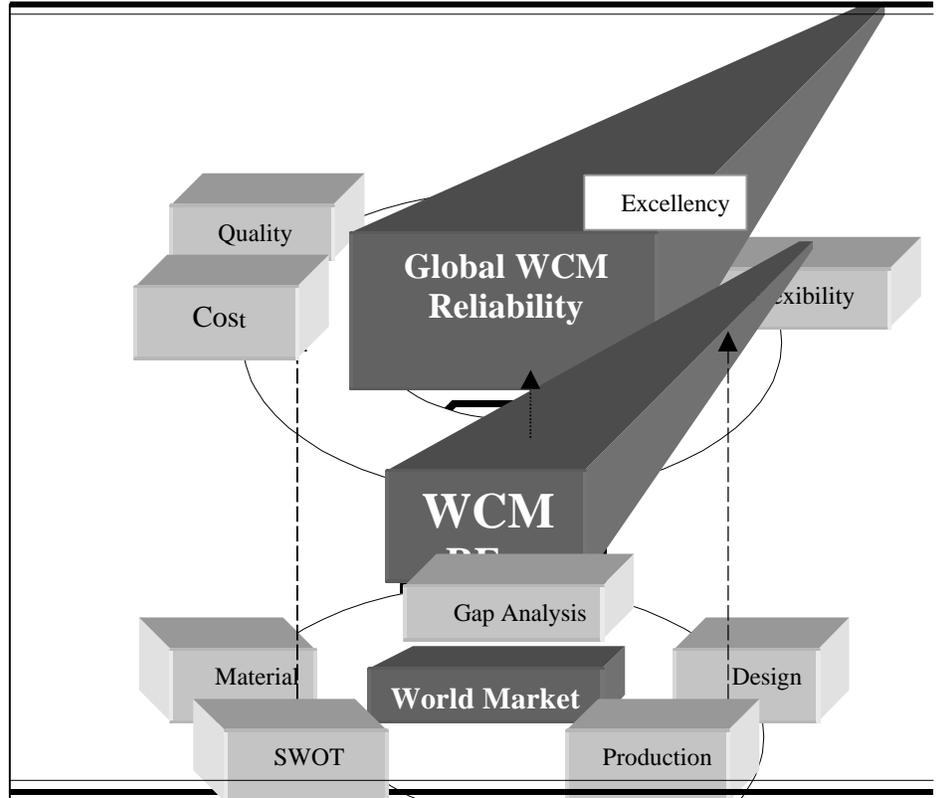
| Dimensions | Measurement Criteria for Reliability |
|------------|---|
| Cost | <ul style="list-style-type: none"> a. Unit product cost b. Unit labour cost c. Unit material cost d. Total manufacturing overhead cost e. Inventory turnover-work-in-process f. Capital productivity g. Capacity/machine utilisation h. Materials yield |
| Quality | <ul style="list-style-type: none"> a. Internal failure cost-scrap/rework, percentage defective/rejected b. External failure cost-frequency of failure in field c. Mean time between failure d. Number of engineering changes e. Incoming supplier quality |

The emphasis of dynamic WCM is put on the resolution of the problems that reasons quality poor, instead of only detecting. The goal is resolves the root causes of quality problems and to show that company can achieve zero defects. The purpose of dynamic WCM management quality is not increase the number of inspection people involved with tracing defects but develop awareness of quality issues in the shop floor operators that entire workforce is harnessed to the quest for product perfection this will require change to both the design and manufacturing processes so that high quality can be built into the product instead of poor quality being inspected out. High reliability means low cost, high profitability and quality, high market share, low absenteeism, low personnel turnover and high motivation. A useful framework for analysing the problems of the manufacturing operations for successful WCM management is shown in figure (2).

Quality and customer includes, define dynamic WCM in term of your customers needs. This structure can be used to describe both large and small organisations and WCM in large organisations operates at all levels. The manufacturing capability that defines develop manufacturing operations that are flexible and able to

(1) Schonberger, R.J, 1986, "World Class Manufacturing": The Lessons of Simplicity Applied, Macmillan, New York.

rapidly respond to changes in product and markets. Performance measurement that describe flexible performance measurement systems that linked to company strategic objectives.



“Fig (2) Dr Farsijani. H Model of Management for World Market”

Global WCM that include investment strategy based on a clearly defined vision of future competitive requirements (1) such as, determining reliability norms, developing a reliability management methodology and the demonstrability of reliability in the manufacturing.

a) Determining Dynamic WCM Reliability Norms

Norms are necessary for the WCM reliability and evaluation of whether, how much reliability has been generated. There is hardly a traditional in professional manufacturing to make explicit WCM reliability norms.

(1) Hill,T,1989, "Manufacturing Strategy": Text and Cases, Homewood,IL, Down Jones-Irwin.

b) Developing a Dynamic WCM Reliability Management Methodology

To control a professional manufacturing the management has to have an adequate model of it. Not all manufacturing are the same or function according to the same model. There are different possible forms of manufacturing with various leadership styles. Managing WCM management requires re-thinking, re-engineering process and working in levels of control.

c) The Demonstrability of dynamic WCM Reliability Management

Demonstrability WCM reliability to customers becomes more and more important. There are problems concerning the formulation of operational definitions and the measurement of WCM reliability. The process and output characteristics manufacturing make systematic and reliability difficult.

A dynamic WCM reliability analysis can be employed as part of an internal control of working conditions. The model refers to technologies and systems that represent the best modern manufacturing practices successfully implemented in the companies. Consequently, quality, cost and flexibility are key to achieve

more reliability management. The programme planning for WCM is to develop a rate-based production plan that means target output of each production cell and will be the basis for forecasting machine, manpower and raw material requirements. Next stage is to initialise the focused company design. This step starts with a process flow analysis of the product. These two stages provide all the information necessary for machine and manpower allocation to the company.

5. CASE STUDY

A case study is being conducted at a certain company, called the company A. A key aspect of testing the concepts developed in the research programme has been the collaboration of several companies. Company A, whose business is the manufacture of domestic goods epitomises in many respects the type of company involved in the research and its growth mirrors the framework put forward by Hill, T (1989). Having started off on a small scale, the company quickly gained a reputation for innovation and design and enjoyed steady sales growth to the point where it presently has a turnover of some £104 million per annum and has over 1034 employees. The company claims around a 53 per cent market share for its products and can be regarded as a market leader. Whilst the company has enjoyed increased sales through successful innovations in its product range it has invested relatively little in changing existing production techniques. Increased production volumes were dealt with simply by scaling up existing methods without a strategic overview of whether it was using the most efficient technologies available. Although this approach has held the company in good stead, there is a growing appreciation among the management that while its product range and marketing is world-class it needs to develop an equally effective dynamic WCM strategy, particularly in the face of growing international competition, notably from Europe.

CONCLUSIONS

The optimisation of the dynamic WCM management is one of the basic world market strategies. Competitive advantages, investment in WCM may be considered as an opportunity to gain an edge over main competitors. Although tactically and economically no immediate benefits can be foreseen, senior managers may consider this type of investment as a move of strategic importance for achieving world market. Results suggest that management should prepare and consider proposals in dynamic WCM with greater emphasis on the long term profitability and competitiveness of their companies, balancing-as any policy decision-the rewards from such projects against the associated risks, including the consequence of doing nothing.

A dynamic WCM reliability analysis can be employed as part of an internal control of working conditions. The objective of the global WCM is to identify reliability for world market. The model refers to technologies and systems that represent the best modern manufacturing practices successfully implemented in the companies. Dynamic Global WCM was regarded as any new technique which, when adopted, is likely to require a change not only in manufacturing practice, but also in management systems and the manufactures approach to the design and production engineering of the product and reliability management. An integrated combination of processes, machine systems, people, organisational structures, information flows, control systems and computers whose purpose is to achieve economic product manufacture and competitive performance. In sum the results show that the main strategic impacts of dynamic global WCM on world market are not primarily technical in nature, but instead due to particular beneficial management practices associated with global WCM adoptions.

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Author Introduction:

Hassan Farsijani, PhD and Post Doctorate from Bradford University, UK. He is the author of reliability, world-class manufacturing, total quality management and several papers and articles published by IEMC 1998 Vancouver British Columbia Canada, AMPST 1999, 1997 UK, IEA 2000 Hawaii USA and China 2001 on these subjects.